

REMARKS

Claims 1-22 have been amended, and new claims 23-34 have been added. Claims 1-34 are pending, with claims 1, 13, and 20 being independent.

Attached hereto is an Appendix entitled "Version with Markings to Show Changes Made" which is a marked-up version of the portions of the application which have been amended by the present amendment, with brackets indicating deleted matter and underlining indicating added matter.

Submitted herewith are proposed corrections to Figs. 1 and 5. Upon approval of the proposed corrections and receipt of a Notice of Allowance, the drawings will be corrected in accordance with the procedure established therefor.

Claims 1-22 have been amended solely in an effort to improve their form. No new limitations have intentionally been added to claims 1-22 in an attempt to distinguish them over the prior art. In light of this, it is submitted that it would not be proper for the Examiner to make the next Office Action final if it includes any new ground of rejection of any of claims 1-22 over the prior art.

New claims 23-34 depending from independent claims 1, 13, and 20 have been added to recite further features of the present invention.

In the Office Action of October 25, 2001, claims 1, 13, and 20 were rejected under 35 USC 102(e) as being anticipated by "the Applicant admitted prior art".

Claims 2-3, 5-7, 10, 14, 17-18, and 22 were rejected under 35 USC 103(a) as being unpatentable over "the Applicant admitted prior art" in view of Gunjima et al. (Gunjima) (U.S. Patent No. 5,587,816).

Claims 8, 15, and 21 were rejected under 35 USC 103(a) as being unpatentable over "the Applicant admitted prior art" in view of Gunjima and Yuuki et al. (Yuuki) (U.S. Patent No. 6,147,725).

Arguments traversing these rejections with respect to claims 1-22 were presented in the amendment of February 25, 2002. Additional arguments traversing these rejections with respect to claims 2-4 and to new claims 23-34 are presented below.

It is submitted that Gunjima does not disclose the features of dependent claim 2 depending from independent claim 1 wherein the reflective polarizer is arranged so that the polarized light transmission axis of the reflective polarizer is approximately parallel to a major axis direction of a pixel of the liquid crystal display element, or the features of dependent claim 3 depending from dependent claim 2 wherein the reflective polarizer is composed so as to have a light directivity in a minor axis direction of the pixel, and wherein the screen is composed so as to broaden projected light in the minor axis direction of the pixel, notwithstanding the Examiner's position to the contrary.

Furthermore, it is submitted that "the Applicant admitted prior art" does not disclose the feature of dependent claim 4

depending from dependent claim 3 wherein the reflective polarizer is arranged so that the polarized light transmission axis of the reflective polarizer is approximately perpendicular to a light control axis of the light control element or the feature of new dependent claims 23, 27, and 31 depending from independent claims 1, 13, and 20 wherein the polarized light transmission axis of the reflective polarizer is substantially perpendicular to a light control axis of the light control element as shown, for example, in Fig. 5 in combination with all of the other features recited in claim 4 and new dependent claims 1, 13, and 20 by virtue of their dependency from independent claims 1, 13, and 20.

Although prior-art Fig. 36 of "the Applicant admitted prior art" shows that the polarized light transmission axis 31 of reflective polarizer 30 is approximately or substantially perpendicular to a light control axis 41 of light control element 40 as recited in claim 4 and new dependent claims 23, 27, and 31, it is submitted that prior-art Fig. 36 does not disclose a screen as recited in claim 4 and new dependent claims 1, 13, and 20 by virtue of their dependency from independent claims 1, 13, and 20.

Furthermore, it is submitted that prior-art Fig. 36 does not disclose the feature of new dependent claims 24, 28, and 32 depending from new dependent claims 23, 27, and 31 wherein the light control element is the only light control element arranged between the illumination device and the reflective polarizer as shown, for example, in Fig. 5 because prior-art

Fig. 36 shows two light control elements 40 and 42 arranged between illumination device 51, 53, 54 and reflective polarizer 30.

Nor is it seen where the features of claim 4 and new dependent claims 23-24, 27-28, and 31-32 discussed above are suggested by "the Applicant admitted prior art", Gunjima, and Yuuki.

Furthermore, it is submitted "the Applicant admitted prior art", Gunjima, and Yuuki do not disclose or suggest the feature of new dependent claim 25 depending from dependent claim 3 wherein a ratio of a length of the pixel in the major axis direction to a length of the pixel in the minor axis direction is substantially 3:1; or the feature of new dependent claim 29 depending from independent claim 13 wherein a ratio of a length of the pixel in the major axis direction to a length of the pixel in a minor axis direction of the pixel is substantially 3:1; or the feature of new dependent claim 33 depending from independent claim 20 wherein a ratio of a length of the pixel in the major axis direction to a length of the pixel in a minor axis direction of the pixel is substantially 3:1.

Furthermore, it is submitted that Yuuki does not disclose the features of new dependent claim 26 depending from dependent claim 8 wherein the declined planes form stripes on the reflector, and wherein the stripes on the reflector are substantially parallel to a major axis direction of a pixel of the liquid crystal display element; or the features of new

dependent claim 30 depending from dependent claim 15 wherein the declined planes form stripes on the reflector, and wherein the stripes on the reflector are substantially parallel to the major axis direction of the pixel; or the features of new dependent claim 34 depending from dependent claim 21 wherein the reflector includes numerous declined reflective planes forming stripes on the reflector, and wherein the stripes on the reflector are substantially parallel to the major axis direction of the pixel.

Nor is it seen where the feature of new dependent claims 26, 30, and 34 discussed above are suggested by "the Applicant admitted prior art", Gunjima, and Yuuki.


Since "the Applicant admitted prior art", Gunjima, and Yuuki do not disclose or suggest the features of claims 2-4 and 23-34 discussed above, it is submitted that claims 2-4 and 23-34 patentably distinguish over "the Applicant admitted prior art", Gunjima, and Yuuki in the sense of 35 USC 102(e) and 103(a), and it is respectfully requested that the rejection of claims 2-4 under USC 103(a) as being unpatentable "the Applicant admitted prior art" in view of Gunjima be withdrawn, and that claims 23-34 be allowed.

For the reasons set forth above and in the amendment of February 25, 2002, it is submitted that all of the Examiner's objections and rejections have been overcome, and that the application is now in condition for allowance. Reconsideration of the application and an action of a favorable nature are respectfully requested.

Please charge any shortage in fees due in connection with the filing of this paper, or credit any overpayment of fees, to the deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (503.36984X00).

Respectfully submitted,

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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

Changes made to the application by the present amendment are indicated below, with brackets indicating deleted matter and underlining indicating added matter.

IN THE CLAIMS

New claims 23-34 have been added.

Claims 1-22 have been amended as follows:

- 1. (Amended) A liquid crystal display device comprising:
- an illumination device;[,]
 - a light control element arranged at a projected light side of [said] the illumination device;[,]
 - a reflective polarizer arranged at an upper portion of [said] the light control element so that [the] a polarized light transmission axis of [polarized light] the reflective polarizer is adjusted so as to increase [the] a transmission rate of [the] projected light from [said] the illumination device;[,]
 - a liquid crystal display element for controlling polarization of projected light projected from [said] the reflective polarizer;[,]
 - and
 - a screen arranged at an upper portion of [said] the liquid crystal display element.

2. (Amended) A liquid crystal display device [as claimed in] according to claim 1, wherein [said] the reflective polarizer is arranged so that the polarized light transmission axis of [said] the reflective polarizer is approximately [in] parallel [with] to a major axis direction of a pixel of [said] the liquid crystal display element.

3. (Amended) A liquid crystal display device [as claimed in] according to claim 2, wherein [said] the reflective polarizer is composed so as to have [the] a light directivity [of the light] in a minor axis direction of [said] the pixel;[,] and [said] wherein the screen is composed so as to broaden [the] projected light in the minor axis direction of [said] the pixel.

4. (Amended) A liquid crystal display device [as claimed in] according to claim 3, wherein [said] the reflective polarizer is [composed] arranged so that [said] the polarized light transmission axis of the reflective polarizer is [arranged] approximately [perpendicularly] perpendicular to a light control axis of [said] the light control element.

5. (Amended) A liquid crystal display device [as claimed in] according to claim 4, wherein [said] the screen is composed so as to absorb external light and to transmit the projected light from [said] the illumination device.

6. (Amended) A liquid crystal display device [as claimed in] according to claim 1, further [comprises:] comprising a birefringent medium arranged between [said] the illumination device and [said] the light control element.

7. (Amended) A liquid crystal display device [as claimed in] according to claim 1, wherein [said] the liquid crystal display element [comprises] includes:

at least a pair of transparent substrates;[,]

a liquid crystal layer interposed between [said] the pair of transparent substrates;[,]

and a pair of absorption type polarizers arranged so that [said] the pair of transparent substrates are held between [them] the pair of absorption type polarizers.

8. (Amended) A liquid crystal display device [as claimed in] according to claim 1, wherein [said] the illumination device [comprises] includes:

a flat [shaped] waveguide[,]

having a front plane and a rear plane, the front plane of the waveguide constituting a light projecting plane of the waveguide, the rear plane of the waveguide having numerous depressed planes, protruded planes, or steps, the depressed planes, protruded planes, or steps having respective slightly declined planes;

a light source arranged [adjacently] adjacent to [said] the waveguide;[,]

[a reflector composed of numerous depressed planes, protruded planes, or steps, each of which have slightly declined planes, at a rear plane of said waveguide, and]

a reflector arranged at [said] the rear plane of [said] the waveguide, the reflector either contacting the rear plane of the waveguide directly, or being spaced from the rear plane of the waveguide via an air layer;[,]

wherein [said] the waveguide and [said] the light source are composed so that [the] projected light from [said] the light source is propagated in [said] the waveguide and projected from the light projecting plane of [said] the waveguide;[,]

[said] wherein the declined planes of [said] the reflector are [manufactured to be] mirrors.

9. (Amended) A liquid crystal display device [as claimed in] according to claim 1, wherein [said] the light control element is any one of an isotropic medium and a uniaxial birefringent medium.

10. (Amended) A liquid crystal display device [as claimed in] according to claim [2] 7, further comprising[:] a reflective color selective layer corresponding to the pixel of [said] the liquid crystal display element.

11. (Amended) A liquid crystal display device [as claimed in] according to claim 7, wherein a [half value] half-value

width of projected light $[\theta_1]$ θ_1 (an angular range wherein [the] a brightness becomes 1/2 of [the] a peak value) from [said] the illumination device in at least a certain direction satisfies a relationship expressed by the following equation:

$$[\theta_1 \leq \sin^{-1}(n \cdot \sin(\tan^{-1}(2d/t)))]$$

$$\theta_1 \leq \sin^{-1}(n \cdot \sin(\tan^{-1}(2d/t)))$$

where[,]

$t[:]$ is a thickness of [said] each of the pair of transparent [substrate] substrates,

$n[:]$ is a refractive index of [said] each of the pair of transparent [substrate] substrates, and

$d[:]$ is a length of the pixel in a minor [side] axis direction of the pixel. [of said liquid crystal display element.]--

--12. (Twice Amended) A liquid crystal display device [as claimed in] according to claim 10, wherein [said] the liquid crystal layer, [said] the reflective [polarizing selective layer] polarizer, [said] the absorption type [polarizing selective layer] polarizers, and [said] the reflective color selective layer are arranged so that [the] a viewing angle of the liquid crystal display device is broadened in a direction perpendicular to [the] a stripe direction of [said] the reflective color selective layer.--

--13. (Amended) A liquid crystal display device comprising:
an illumination device;[,]

a light control element arranged at a projected light side of [said] the illumination device;[,]

a reflective polarizer arranged at an upper portion of [said] the light control element;[,]

a liquid crystal display element for controlling polarization of projected light projected from [said] the reflective polarizer so that [the] a major axis direction of a pixel of the liquid crystal display element is arranged approximately [in] parallel [with] to a direction [wherein the] in which a linearly polarized light component of [the] projected light projected from [said] the illumination device is high;[,]

a screen arranged at an upper portion of [said] the liquid crystal display element.

14. (Amended) A liquid crystal display device [as claimed in] according to claim 13, further [comprises:] comprising a birefringent medium arranged between [said] the illumination device and [said] the light control element.

15. (Amended) A liquid crystal display device [as claimed in] according to claim 13, wherein [said] the illumination device [comprises] includes:

a flat [shaped] waveguide[,]

having a front plane and a rear plane, the front plane of the waveguide constituting a light projecting plane of the waveguide, the rear plane of the waveguide having numerous depressed planes,

protruded planes, or steps, the depressed planes, protruded planes, or steps having respective slightly declined planes;

a light source arranged [adjacently] adjacent to [said] the waveguide;[,] and

[a reflector composed of numerous depressed planes, protruded planes, or steps, each of which have slightly declined planes, at a rear plane of said waveguide, and]

a reflector arranged at [said] the rear plane of [said] the waveguide, the reflector either contacting the rear plane of the waveguide directly, or being spaced from the rear plane of the waveguide via an air layer;[,]

wherein [said] the waveguide and [said] the light source are composed so that [the] projected light from [said] the light source is propagated in [said] the waveguide and projected from the light projecting plane of [said] the waveguide;[,] and

[said] wherein the declined planes of [said] the reflector are [manufactured to be] mirrors.

16. (Amended) A liquid crystal display device [as claimed in] according to claim 13, wherein [said] the light control element is any one of an isotropic medium and a uniaxial birefringent medium.

17. (Amended) A liquid crystal display device [as claimed in] according to claim 13, further [comprises:] comprising a

reflective color selective layer corresponding to a pixel of [said] the liquid crystal display element.

18. (Amended) A liquid crystal display device [as claimed in] according to claim 13, wherein [said] the liquid crystal display element [comprises] includes:

at least a pair of transparent substrates;i[,]

a liquid crystal layer interposed between [said] the pair of transparent substrates;i[,]

 and

a pair of absorption type polarizers arranged so that [said a] the pair of transparent substrates are held between [them] pair of absorption type polarizers.

19. (Amended) A liquid crystal display device [as claimed in] according to claim [7] 18, wherein a [half value] half-value width of projected light [θ_1] θ_1 (an angular range wherein [the] a brightness becomes 1/2 of [the] a peak value) from [said] the illumination device in at least a certain direction satisfies a relationship expressed by the following equation:

$$[\theta_1 \leq \sin^{-1}(n \cdot \sin(\tan^{-1}(2d/t)))]$$

$$\theta_1 \leq \sin^{-1}(n \cdot \sin(\tan^{-1}(2d/t)))$$

where[,]

t[:] is a thickness of [said] each of the pair of transparent [substrate] substrates,

n[:] is a refractive index of [said] each of the pair of transparent [substrate] substrates, and

d[:] is a length of the pixel in a minor [side] axis direction of the pixel. [of said liquid crystal display element.]

20. (Amended) A liquid crystal display device comprising:

an illumination device_i[,]

a light control element arranged at a projected light side of [said] the illumination device_i[,]

a reflective polarizer arranged at an upper portion of [said] the light control element[, wherein the] so that a polarized light transmission axis of [polarized light] the reflective polarizer is arranged so that a rate of transmission of [the] polarized light projected from [said] the illumination device is increased_i[,]

a liquid crystal display element for controlling polarization of projected light projected from [said] the reflective polarizer so that [the] a major axis direction of a pixel of the liquid crystal display element is arranged approximately [in] parallel [with] to a direction [wherein the] in which a linearly polarized light component of the [projected] polarized light projected from [said] the illumination device is high_i[,] and

a screen arranged at an upper portion of [said] the liquid crystal display element.

21. (Amended) A liquid crystal display device [as claimed in] according to claim 20, wherein [said] the illumination

device [comprises] includes a reflector arranged at [its] a rear plane of the illumination device.

22. (Amended) A liquid crystal display device [as claimed in] according to claim 20, wherein [said] the liquid crystal display element [comprises] includes:

at least a pair of transparent substrates;_i[,]

a liquid crystal layer interposed between [said] the pair of transparent substrates;_i[,] and

a pair of absorption type polarizers arranged so that [said] the pair of transparent substrates are held between [them] pair of absorption type polarizers.--